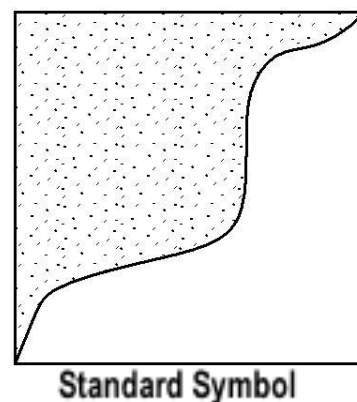


EC-11 GEOTEXTILES, PLASTIC COVERS & EROSION CONTROL BLANKETS/MATS

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212, 621, and 711.

ITD Standard Drawing P-2-C.

QPL Category: 621 Erosion Blanket – Rolls (RECPs)



Definition and Purpose

This BMP involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to temporarily stabilize disturbed soil areas and protect soils from erosion by wind or water.

Appropriate Applications

These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 3:1
- Slopes with loose soils or non-cohesive sandy and/or silty material.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 3.3 feet/second.
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies of environmentally sensitive areas (ESAs).

BMP Objectives

- | | |
|-------------------------------------|-----------------------|
| <input type="checkbox"/> | Perimeter Control |
| <input checked="" type="checkbox"/> | Slope Protection |
| <input checked="" type="checkbox"/> | Borrow and Stockpiles |
| <input checked="" type="checkbox"/> | Drainage Areas |
| <input type="checkbox"/> | Sediment Trapping |
| <input type="checkbox"/> | Stream Protection |
| <input checked="" type="checkbox"/> | Temporary Stabilizing |
| <input checked="" type="checkbox"/> | Permanent Stabilizing |

Limitations

- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment or where other measures are not applicable, such as channels.

- Blankets and mats are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (because staples and netting can catch in mowers).
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Non-degradable fabrics must generally be removed when permanent stabilization measures are ready to be installed. Failure to move these materials creates trash that may be environmentally harmful and may result in littering fines.
- Plastic results in 100 percent runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic should be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations. The manufacturer shall be consulted for proper selection.

Material Selection

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions.

Geotextiles

- A wide variety of Geotextiles are available, dependent on their intended uses which range from separation of different materials (such as road bedding and underlying soils) to lining ponds and landfills. For temporary erosion control, geotextile fabrics typically consist of woven or non-woven fabrics that are used to line channels or slopes and are usually used in combination with rock or other mulches or riprap.
- Geomembrane is a more impervious type of geotextile and can be used to cover stockpiles or bare soil areas, where a more durable material (as compared to plastic sheeting) is desired. The use of geomembranes for this application will likely be very limited due to their higher costs.
- Geotextiles should be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under Geotextile. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- Geotextiles may be reused if, in the opinion of the Engineer, they are suitable for the use intended.

Plastic Covers

- Plastic sheeting shall have a minimum thickness of 6 millimeters and shall be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 10 feet apart. Seams are typically taped or weighted down their entire length, and there shall be at least a 12 to 24 inches overlap of all seams. Edges shall be embedded a minimum of 6 inches in soil.

- Any sheeting failures shall be repaired immediately. If washout or breakages occur, the material shall be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats (Rolled Erosion Control Products)

Degradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100 percent degradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be degradable.

- **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately 1 year. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Excelsior (curled wood fiber)** blanket material shall consist of machine-produced mats of curled wood excelsior with 80 percent of the fiber 6 inches or longer. The excelsior blanket shall be of consistent thickness. The wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be smolder-resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket shall be furnished in rolled strips a minimum of 48 inches wide and shall have an average weight of 0.1 pound per square foot (± 10 percent) at the time of manufacture. Excelsior blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- **Straw blanket** shall be machine-produced mats of straw with a lightweight degradable netting top layer. The straw shall be attached to the netting with degradable thread or glue strips. The straw blanket shall be of consistent thickness. The straw shall be evenly distributed over the entire area of the blanket. Straw blanket shall be furnished in rolled strips a minimum of 6.5-feet-wide, 82-feet-long, and 0.055 pound per square foot. Straw blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** shall be machine-produced mats of 100 percent coconut fiber with degradable netting on the top and bottom. The coconut fiber shall be attached to the netting with degradable thread or glue strips. The coconut fiber blanket shall be of consistent thickness. The coconut fiber shall be evenly distributed over the entire area of the blanket. Coconut fiber blanket shall be furnished in rolled strips with a minimum of 6.5-feet-wide, 82-feet-long, and 0.055 pound per square foot. Coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a degradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Straw coconut fiber blanket** shall be machine-produced mats of 70 percent straw and 30 percent coconut fiber with a degradable netting top layer and a degradable bottom net. The straw and coconut fiber shall be attached to the netting with degradable thread or glue strips. The straw coconut fiber blanket shall be of consistent thickness and shall be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket shall be furnished in rolled strips a minimum of 6.5-feet-wide, 82-feet-long, and 0.055 pound per square foot. Straw coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown.

Non-degradable RECPs are typically composed of polyethylene, polypropylene, nylon, or other synthetic fibers. In some cases, a combination of degradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-degradable as well.

- **Plastic netting** is a lightweight biaxially-oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Plastic mesh** is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 2 inches. It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be revegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Bonded synthetic fibers** consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically, it has more than 90 percent open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top

and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Qualified Products List Criteria

All rolled erosion control products shall meet the State of Idaho State Department of Agriculture Seed Laboratory or the North American Weed Management Association (NAWMA) noxious weed-free certification requirements prior to approval.

All RECPs shall:

- Have independent test results submitted shall be from either the National Transportation Product Evaluation Program (NTPEP) or an approved equivalent laboratory.
- Meet or exceed the Standard Specifications recommendations for slope and channel applications as outlined by the Erosion Control Technology Council:

http://www.dlr.enr.state.nc.us/TAC%20website/2008_04_23/SpecJune06Ver5.pdf

Site Preparation

- Prepare the site properly to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation, or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 inches of topsoil. When using a fabric or mat that is designed to be used in conjunction with seeding or revegetation, follow the manufacturer's guidelines for proper seedbed preparation, seed application, and/or planting.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 0.12-inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown. Wire staples shall be minimum of 11 gauge.
- Metal stake pins shall be 0.188-inch-diameter steel with a 1.5-inch steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.

- All anchors shall be a minimum of 6 inches long and have sufficient penetration to resist pullout. Longer anchors may be required for loose soils as determined by the responsible party or by manufacturer's installation guidelines.

Installation on Slopes

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6-inch-deep by 6-inch-wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 6 inches and staple every 3 feet.
- When blankets must be spliced, place blankets end over end (shingle style) with 6 inches of overlap. Staple through overlapped area, approximately 12 inches apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor them and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges.
 - Steep slopes (1:1 to 2:1) require a minimum of 2 staples/yd².
 - Moderate slopes (2:1 to 3:1) require a minimum of 1.5 staples/yd², placing 1 staple/yd on centers.
 - Gentle slopes require a minimum of 1 staple/yd².

Installation in Channels

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 inches deep and 6 inches wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 inches deep and 6 inches wide across the channel at 25- to 30-foot intervals along the channels.
- Cut longitudinal channel anchor slots 4 inches deep and 4 inches wide along each side of the installation to bury edges of matting. Whenever possible, extend matting 2 to 3 inches above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12-inch intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 6 inches.
- Secure these initial ends of mats with anchors at 12-inch intervals, backfill, and compact soil.

- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 6-inch overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot, then fold back against itself. Anchor through both layers of mat at 12-inch intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations. Place two rows of anchors on 6-inch centers at 25- to 30-foot intervals in lieu of excavated check slots.
- Shingle lap ends by overlapping uphill on top of downhill fabric a minimum of 12 inches to prevent water from flowing underneath fabric at splice locations. See schematics at end of this BMP.
- Place edges of outside mats in previously excavated longitudinal slots. Anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 6-inch by 12-inch terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling, just exposing top netting of mat.

Blanket Removal

When no longer required for work, non-degradable temporary blankets shall be removed from the site and disposed.

Maintenance and Inspection

- Inspections shall be conducted as required by the NPDES permit or contract specifications.
- Areas treated with temporary geotextiles, mats, blankets, and other covers shall be maintained to provide adequate erosion control. Temporary geotextiles, mats, blankets, and other covers shall be reapplied or replaced on exposed soils when greater than 10 percent of the previously treated area becomes exposed or exhibits visible erosion or as determined by the responsible party.
- Any failures shall be repaired immediately.

- If washout or breakage occurs, reinstall the material after repairing the damage to the slope or channel.